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October 16, 2001

To: Commissioner of Patents and Trademarks

Washington, D.C. 20231

Fr: George O. Saile, Reg. No. 19,572

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Subject:

Serial No. 09/912,737 07/26/01

Luona Goh, Simon Chooi, Siew Lok Toh, Tong Earn Tay

A METHOD TO IMPROVE ADHESION OF DIELECTRIC FILMS IN DAMASCENE INTERCONNECTS

Grp. Art Unit: 3643

INFORMATION DISCLOSURE STATEMENT

Enclosed is Form PTO-1449, Information Disclosure Citation
In An Application.

The following Patents and/or Publications are submitted to comply with the duty of disclosure under CFR 1.97-1.99 and 37 CFR 1.56. Copies of each document is included herewith.

U.S. Patent 6,184,123 to Ge et al., "Method to Prevent Delamination of Spin-On-Glass and Plasma Nitride Layers Using Ion Implantation," discloses a silicon ion implantation into spin-on-glass to improve adhesioon to an overlying silicon nitride layer.

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- U.S. Patent 6,143,670 to Cheng et al., "Method to Improve Adhesion Between Low Dielectric Constant Layer and Silicon Containing Dielectric Layer," discloses a nitrogen ion implantation into a polymer layer to improve adhesion to an overlying layer containing silicon, oxygen, and nitrogen.
- U.S. Patent 5,985,750 to Oda, "Manufacturing Method of Semiconductor Device," discloses implanting silicon ions into a BPSG layer to form a damage layer before depositing a fluorine amorphous carbon layer.

The following two U.S. Patents teach an ion implantation into spin-on-glass to prevent moisture absorption:

- 1) U.S. Patent 6,117,798 to Fang et al., "Method of Spin-On-Glass Planarization."
- 2) U.S. Patent 5,459,086 to Yang, "Metal Via Sidewall Tilt Angle Implant for SOG."
- U.S. Patent 4,849,248 to Hashimoto, "Ion Implantation Method for Making Silicon-Rich Silicon Dioxide Film," discloses silicon ion implantation into silicon dioxide to control grain size.

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- U.S. Patent 6,153,523 to Van Ngo et al., "Method of Forming High Density Capping Layers for Copper Interconnects with Improved Adhesion," discloses the use of an ammoniacontaining plasma to roughen a copper surface to improve adhesion of an overlying silicon nitride capping layer.
- U.S. Patent 5,192,697 to Leong, "SOG Curing by Ion Implantation," teaches curing of spin-on-glass using ion implantation.

Sincerely,

Stephen B. Ackerman,

Reg. No. 37761